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THE MAMMALIAN FAUNA OF NORTH CARDIGANSHIRE, WITH NOTES ON CERTAIN PECULIARITIES AND RARE SPECIES.

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It is perhaps not altogether a matter for surprise that, in North Cardiganshire, which possesses an attractive and varied avian fauna, the local mammals should have been somewhat neglected. In fact no very serious attempt has been made to study them, and the only list* seems to be that of Dr. J. H. Salter, in the N.U.T. Souvenir (Aberystwyth, 1911). The present paper cannot claim to be exhaustive, owing to pressure of work and the difficulties of travel in this mountainous and sparsely-peopled area. These factors have caused my visits to the hills to be usually of short duration. It is very difficult to elicit any information from the rural population, and many of the promises of help made by friends have remained unfulfilled owing to the abnormal conditions of the past twenty months. Ornithologists of no mean order are met with in many parts of North Cardiganshire, but, apart from that of the gamekeepers, to whom they are mainly "vermin," the mammals, less obtrusive than the birds, attract very little attention—luckily, one is tempted to add.

Despite the drawbacks just mentioned, in view of several

* In his book 'The Vertebrate Fauna of North Wales,' Mr. H. E. Forrest gives a number of North Cardiganshire records.

interesting occurrences experienced, the time seemed not inopportune to write a short account of them, together with a list of the mammals. Several new records are included, and it is probable that the future will yield some others. I have been fortunate in obtaining the help and advice of Messrs. Hutchings, Taxidermists and Naturalists, of Aberystwyth. Through their kindness I have been able to examine a very large number of locally-killed animals in a fresh condition. I must also express my thanks to the several gentlemen who have kindly supplied me with information, and to Mr. W. E. Whitehouse, of the University College of Wales, Aberystwyth, for his advice and assistance.

NORTH CARDIGANSHIRE.—TOPOGRAPHY.

North Cardiganshire is bounded on the north by the River Dovey and the Afon Llyfnant, on the east by Plynlymon and the western slope of the Central Plateau of Wales, and on the south by the Wyre stream and the upper portion of the River Ystwyth. Its western edge forms the middle portion of the coast of Cardigan Bay. The chief physical features which call for notice in this area are briefly dealt with below. For the purpose of this paper, however, it will be necessary to include a larger area, although the greater number of the records fall well within the limits described above.

North Cardiganshire may be divided into (1) the High Plateau of the interior, and (2) the Coastal Plateau. A definite coastal plain is absent in this county, and the only low-lying land fringing the coast is the large marshy tract of Cors Fochno, now better known as Borth Bog. This forms the south shore of the great inlet of the estuary of the River Dovey, in the extreme north of the county. Borth Bog is composed of a substratum of glacial drift overlain by considerable deposits of peat. Apart from the fact that it furnishes some peat fuel to the district, and also affords pasture to a few sheep, it is little used and rarely frequented. It supplies a refuge and breeding-place for various birds and mammals.

The Central Wales Plateau consists of that land which may be described roughly as exceeding 900 ft. in altitude, and culminating in the Plynlymon ridge in the north. A great part of the moorland comprising the High Plateau is uninhabited, and



it exhibits the sparse vegetation characteristic of such regions. Its treeless, and for the most part trackless, surface bears numerous patches of (sometimes treacherous) bog, and occasional *llyn*s or tarns. Many streams have their source on the High Plateau, and flow in all directions. The valley sides often bear a good deal of timber.

One especially wild portion of the High Plateau must be mentioned here, although the greater part of it lies far to the south of the district herein called North Cardiganshire. This tract is especially noted because it would seem to have an important bearing on certain peculiarities in the local mammalian fauna, which will be described in another place. This great barren tract is one of the wildest districts to be found within the confines of the British Isles. It may be located as lying between the village of Ystrad Meurig and Rhayader on the north, and Lampeter and Llanwrtyd Wells on the south. The area of this portion of the High Plateau is approximately 350 square miles.

The land in the neighbourhood of Plynlymon is, if anything, still more rugged and wild than the tract just described, but it is of less importance faunistically. Here great stretches of peaty soil are found, which bear only the very sparsest covering of vegetation. These conditions are not suited to some mammals upon the presence of which depend other species (see under Rabbit in list of species). Much of the western edge of the High Plateau has been altered in the search for lead, and this has also resulted in the making of some fair roads. The ponds in the vicinity have in many cases been adapted to supply power to the mines.

The High Plateau descends fairly abruptly to the Coastal Plateau, forming the whole of the remainder of the land surface, and extending to the coast. The height of the Coastal Plateau stands fairly uniformly at 500 ft. above O. D., and, except where it is interrupted by river-valleys, it meets the sea in well-marked cliffs. The edge of the High Plateau, and the whole of the Coastal Plateau, are broken up by numerous deep valleys, those north of Aberystwyth running generally due east and west. The valleys are in some cases fairly well wooded, but the woods are for the most part without dense undergrowth, though for some few of the woods this statement needs some modification.

The passes through the mountain barrier which isolates Cardiganshire are few in number, and are themselves situated at a great height. Eisteddfa-Gurig (1350 ft.), a short distance south of Plynlymon, is the most important of them.

This barrier would seem to have excluded some birds approaching it from the east, and possibly some of the smaller mammals also. On the other hand, it has offered an asylum for other birds which have deserted many of their former haunts in Britain, owing to the draining of the land.

It will be attempted to show that the High Plateau has not been without its effect on the mammalian fauna of North Cardiganshire, which has undoubtedly found in it a sanctuary.

The conclusions which I have deduced from the records appear to me to be fully supported by the facts as these stand at present. Some modifications may be necessary as new records occur, but I venture to believe that such will but tend to strengthen the views which I have set forth in this paper.

LIST OF SPECIES.

NOCTULE, OR GREAT BAT (*Pterygistes noctula*, Leisler).—Occurs in the district (Salter). Two large Bats, which probably belonged to this species, were repeatedly seen in the summer of 1915, at Penparke, near Aberystwyth, by Mr. F. Hutchings.

PIPISTRELLE, OR COMMON BAT (*Pterygistes pipistrellus*, Schreb.).—Fairly common in the district. It would appear to venture into the settlements but rarely, as I have observed it to do elsewhere. It is occasionally seen on the Marine Terrace at Aberystwyth, where one was killed in a house in 1915 (Mr. H. R. Williams).

NATTERER'S BAT (*Myotis nattereri*, Kuhl.).—"A colony of Natterer's Bat has been found frequenting the tower of Llangorwen Church"—near Aberystwyth (Salter).

LONG-EARED BAT (*Plecotus auritus*, Linn.).—Not a great deal is known with regard to the distribution of this Bat, which seems, however, to be fairly common. Mr. A. E. Lloyd showed me a specimen which he found recently in his bedroom at Rhydypennau, near Llanfihangel geneu'r-glyn.

HEDGEHOG (*Erinaceus europæus*, Linn.).—Common almost everywhere in North Cardiganshire. It is not infrequently found

in the streets of Aberystwyth Town, where it is sometimes carried by Dogs. I have sometimes heard its loud and plaintive cry from a considerable distance, when it is terrified. Long before dark, individuals may be seen crossing the roads, and many of them are of large size. In the evening of November 16th, 1915, I caught a large Hedgehog in the roadway at Penparke as it was running nimbly along. The day was a cold one, and frequent and very heavy hail-showers were falling. This cold spell had commenced some days previously. Hibernation had probably commenced some time before this date, and this individual was perhaps aroused through some unusual event.

MOLE (*Talpa europæa*, Linn.).—Exceedingly common everywhere, even at a considerable height. Yellow-white specimens, generally called albinos, are not infrequently taken.

COMMON SHREW (*Sorex araneus*, Linn.).—Common in the district (Salter and others).

WATER-SHREW (*Neomys fodiens*, Pall.).—Occurs in the district. Mr. H. R. Dickinson has seen a specimen in a stream at Ponterwyd (on the High Plateau).

WILD CAT (*Felis sylvestris*, Schreb.).—Long extinct in the district. I can find no records of the dates when the last local specimens were killed. Feral Cats are not uncommon in the preserved areas. I am convinced that the rare sight of the Pine-Marten (see under "Pine-Marten" in list of species and notes) gives rise to some of the stories sometimes current in the district of the appearance of a "true Wild Cat." It is at all events significant that the bushiness of the tail is very frequently cited by the observers.

Fox (*Canis vulpes*, Linn.).—Common in North Cardiganshire, where, owing to the nature of the country, it is hunted with difficulty. Foxes are sometimes observed on the main roads near Aberystwyth. A fine male, from near Llanfarian, near Aberystwyth, measured over 47½ in. from the tip of the nose to the end of the tail, and turned the scale at eighteen pounds. The years 1914-15 saw much depredation by Foxes in the poultry-yards and sheep-folds in some parts of Cardiganshire. In fact, Foxes were so numerous and troublesome that the farmers were compelled to organise regular "shoots" in

self-defence. Well-marked colour-differences occur among the Foxes in the district (see notes on the mammals).

PINE-MARTEN (*Mustela martes*, Linn.).—Excessively rare on the Coastal Plateau, but a few may survive on the High Plateau east of Tregaron. A young male was trapped near Crosswood early in the summer of 1915, and I examined it in a fresh state. Mr. Hutchings said that this specimen was the first local Marten to pass through his hands for quite thirty years. It is believed to have been seen occasionally in the district during recent years (see under notes on the mammals).

This specimen was acquired for the Zoological Collection of the University College of Wales, Aberystwyth.

POLECAT (*Mustela putorius*, Linn.).—Still not uncommon in North Cardiganshire, and, although it is relentlessly persecuted, its numbers appear to be fairly well maintained. Polecats are most numerous about Crosswood and Tregaron, and a good number are killed at Borth. The bogs at Borth and Tregaron favour this species, and all gamekeepers and sportsmen who are familiar with it are in agreement as to its choice of damp, but not marshy, soil. It ranges from the valleys up to at least 1300 ft. above sea-level,* and, in fact, wherever Rabbits are found. Polecats are sometimes observed on the shores of the Teifi Lakes, some distance east of Ystrad Meurig, where there are also a few Rabbits (Messrs. G. Fellowes, D. Lloyd, W. Phillips, T. Hopkins, etc.). These lakes are situated on the High Plateau, and they are much frequented by anglers. Mr. T. Hopkins, for many years a keeper in the Crosswood district, has given me some interesting details relating to the Polecats in his neighbourhood. He states that they subsist very largely on Frogs, and that they seek and devour greedily ripe blackberries. They are also recorded (Mr. J. Pryce Howell) from Ysppyty-Ystwyth (700 ft.), and a hill near this village known as Mynydd-Bach (over 1000 ft.). Males are more numerous than females among the caught specimens. Mr. Hutchings receives large numbers for preservation every year. Many of the individuals are extremely dark in colour, and some are almost black.

POLECAT (*Mustela putorius*, Linn.). **LOCAL LIGHT-BROWN**

* This statement holds good only for those places concerning which I have been able to get information. See also under Rabbit in list of species.

VARIETY.—During the last ten or twelve years a number of Polecats of a very light colour have been killed in North Cardiganshire. In all other respects they resemble the dark-coloured animal, but the largest specimen of the light variety that has been caught exceeds slightly in size even the large individuals of the common Polecat. The colour may be described roughly as : underfur light buff, the longer hairy coat being a reddish-brown. When seen in sunlight the latter shows a kind of faint purple "haze"; it is difficult to describe it otherwise. The facial markings are the same in the dark specimens in all the examples which I have examined, but this would appear to be not invariably the case, according to Mr. Forrest ('The Vertebrate Fauna of North Wales'). These light Polecats are killed from time to time. There are only some three records of them for the years 1914-15, but this may be due to the unsettled condition of the country rather than to greater scarcity. (See also under notes on the mammals.)

I give a list of some of the localities in which this light Polecat has been killed, Mr. Hutchings being my informant with regard to the earlier occurrences.

The first light Polecats were killed some years ago at Tregaron. The parents were a dark male and a light female, while the young (about four) all closely resembled the light-coloured mother. Another male (Tregaron). A very large male* (near Llanilar). A male (Crosswood). A male (Goginan). A male (near Ynyslas). Other specimens, of which the sex is not known, were caught near Llanbadarn-fawr (one), Penllwyn (one), and Bow Street (one). A young individual was killed on Borth Bog early in the summer of 1915. Another, belonging to the same litter, resembled the common dark Polecat in every respect.†

STOAT (*Putorius ermineus*, Linn).—Abundant in the uplands and lowlands of north Cardiganshire. It has been killed in the middle of the town of Aberystwyth (1912). Stoats may often be seen on the main and other roads of the district. During wet winters I have observed that they become very bold and fearless. At such times I have actually released young Rabbits from them,

* Now in the U.C.W. Zoological Collection.

† In the same Collection. See also notes on the local mammals, where this occurrence is discussed more fully.

the fierce little carnivore looking on resentfully meanwhile, not greatly perturbed by my presence. Ermines are not uncommonly taken in cold winters, but these generally retain a trace of the summer colour, whilst the rest of the body is a very pale sulphur-yellow—rarely pure white. During the present winter (1915–16) I have seen a number of really white Ermines, which were killed in North Cardiganshire. A very large specimen from Ynyslas, and probably a male, was of a uniform snow-white colour, save for the dark-tipped tail.

WEASEL (*Putorius nivalis*, Linn.).—Numerous everywhere in the district, although seen less frequently than the Stoat, probably owing to its more diminutive size. Mr. Hutchings has seen two pure white Weasels in the district. These were a male and female, and they were killed near Talybont during a cold spell of rather greater severity than is usual in West Wales.

BADGER (*Meles meles*, Linn.).—Fairly numerous in the district, although, owing to its nocturnal habit, not often seen. These animals are said to devour Hedgehogs greedily,* and to rob the nests of Wasps, probably to get at the grubs (Mr. T. Hopkins). Badgers attain a large size in North Cardiganshire and adjoining counties, and one specimen which I saw weighed no less than 26 lb. It was caught near Machynlleth, Montgomeryshire, and therefore just outside our area. The hams of this large individual were eaten by an Aberystwyth gourmet! Badgers were rather scarce in the district thirty years ago (Mr. F. Hutchings). In some parts of Montgomeryshire they are believed to attack the lambs, but here, again, we may suspect the astute Fox.

OTTER (*Lutra lutra*, Linn.).—Still far from scarce, especially in the southern part of the district, and where the rivers and streams are not polluted by the washings from the lead-mines. Some of the specimens which I have examined showed splendid fur and condition. Otters were fairly numerous in the lower Leri until recently, but they have now deserted this place, which, owing to mine pollution, is destitute of fish.

COMMON SEAL (*Phoca vitulina*, Linn.).—Seals are sometimes seen on the coast of North Cardiganshire, and they are said to breed in the vicinity of Monk's Cave. This species is not infrequently observed from the Marine Terrace at Aberystwyth. I

* Mr. Forrest has already noted this fact.

have myself seen three from this place swimming close inshore. They occasionally ascend the Dovey Estuary for a distance of three miles (Captain Enoch Lewis). It is to the credit of the Cardiganshire people that this interesting animal is seldom molested.

GREY SEAL (*Halichærus gryphus*, Fabr.).—This species is recorded by Dr. Salter as sometimes frequenting the locality noted for the Common Seal. I have not heard that it has been observed very recently.

SQUIRREL (*Sciurus vulgaris*, Linn.).—Frequents all the wooded areas in North Cardiganshire up to a fair height. It cannot be said to be common, and in some places its numbers are diminishing (Mr. T. Hopkins). Individuals showing conspicuous patches of white fur have been observed at Llanilar and Clarach (Mr. W. Phillips).

DORMOUSE (*Muscardinus avellanarius*, Linn.).—I do not know anything with regard to the distribution of this species, nor have I ever seen a local specimen. It is recorded by Dr. Salter, and Mr. Hutchings informs me that he receives locally-caught specimens at long intervals.

BLACK RAT (*Mus rattus*, Linn.).—Probably extinct here. It has not been recorded for many years.

BROWN, or COMMON RAT (*Mus norvegicus*, Erx.).—Common everywhere.

COMMON, or HOUSE MOUSE (*Mus musculus*, Linn.).—Ubiquitous.

WOOD MOUSE, or LONG-TAILED FIELD MOUSE (*Micromys sylvaticus*, Linn.).—This species is probably common, and it occurs throughout the district. Mr. C. L. Walton saw a specimen of the Yellow-necked variety known as *Mus flavicollis*, in the early part of the summer of 1913, at Rhydyfelin, near Aberystwyth.

WATER VOLE, or WATER RAT (*Microtus amphibius*, Linn.).—Common near the streams, except at great elevations. Near Pendybont Bridge, Llanbadarn-fawr, I have watched some Water Voles which frequented a small pond on the banks of the Rheidol. The pond is quite near to a footpath, and the Voles were very fearless, approaching quite near a spectator, and did not show any great alarm when they were chased away.

FIELD-VOLE, OR SHORT-TAILED FIELD-MOUSE (*Microtus agrestis*, Linn.).—Common. Mr. F. Hutchings recently presented an albino specimen to the U.C.W. Zoological Collection. It was caught near Crosswood some years ago.

COMMON HARE (*Lepus europæus*, Pallas).—Although generally distributed, the Hare can scarcely be described as common in North Cardiganshire. It occurs on Borth Bog, and it is present on the High Plateau at greater elevations than those recorded for the Rabbit (*q. v.*). Mr. R. H. Dickinson says that the upland Hares show more greyness of fur than do the valley specimens.

RABBIT (*Lepus cuniculus*, Linn.).—The distribution of the Rabbit in North Cardiganshire is curiously uneven. The absence of Rabbits in certain places at a high level is due to the peaty nature of the soil. It is more difficult to account for their avoidance of some lowland tracts which are apparently suited to their needs. In many parts of the district they are very abundant. Melanism and other colour-differences are frequently shown. A few Rabbits occur as high as the Teifi Lakes (about 1300 ft.), and at the Angler's Retreat (1285 ft.), but these are perhaps mere stragglers. Peat, rather than any inherent weakness, or inability to withstand the more severe conditions of life on the uplands, may be said to govern the distribution of the Rabbit in height, in this district at least.

LESSER RORQUAL (*Balenoptera acutorostrata*, Lac.).—A fresh carcase of the Lesser Rorqual was washed ashore at the foot of the cliffs between Aberystwyth and Clarach in the winter of 1911. It was probably a male, and it measured 28 ft. "exclusive of the jaw and tail," while its estimated weight was approximately 6 tons (Mr. Mortimer).

BOTTLE-NOSE WHALE (*Hyperoodon rostratus*, Müller).—Stranded (? dead) at Clarach, about 1902, this Whale measured between 14 and 15 ft. The skull, which is unfortunately not complete, is now in the Zoological Collection of the U.C.W., Aberystwyth. I have not been able to discover any other information about the cetacean, but Mr. Jack Edwards, who furnished these details, also showed me a photograph of the specimen.

PORPOISE (*Phocæna phocæna*, Linn.).—Common in Cardigan Bay during the summer.

NOTES ON THE MAMMALS OF NORTH CARDIGANSHIRE.

The Polecat was formerly abundant in Britain, but now its range is very restricted, owing to factors which will be obvious. From time to time its reappearance in a district which it was supposed to have deserted is noted, but some of these records are, perhaps, not above suspicion. The Ferret, which is itself believed to be a Polecat, though possibly a foreign one, mates freely with its wild relative. The hybrids (Polecat-Ferrets, Fitchets, etc.) which result from the cross, often bear a close resemblance to the wild parent in size, colour, and robustness of constitution. Some of the doubtful records may refer to hybrids which have become feral.

Cardiganshire, and more particularly its northern portion, is one of the few places in our Islands where the Polecat still maintains itself in some numbers, owing to physical reasons previously stated. The Borth and Tregaron Bogs have played no small part in preserving this carnivore from extinction. These large marshy tracts are situated in the north and south of North Cardiganshire respectively. They include patches of fair extent of comparatively dry ground, and such situations suit the requirements of the Polecat admirably.

Almost without exception the whole of the very numerous Polecats which I have examined were killed between the edge of the High Plateau and the sea, as would be expected. Much of the area of North Cardiganshire is given up to game, and is strictly preserved. It is from such localities especially that most of the Polecats are obtained, the greater number of them being taken in traps. Whether the Polecat occurs in any numbers on the High Plateau is a matter of conjecture, and one concerning which I have not been able to elicit a great deal of information. In certain parts of it this animal is seen at least as high as 1300 ft. (see under Polecat in list of mammals), and the probability is that it populates the greater part of the edge of this region. Now the habitable and cultivable land in North Cardiganshire forms a relatively narrow strip between the High Plateau and the sea, and this fact may not be without significance. It must be remembered that the yearly toll of these creatures in the district is a heavy and constantly increasing one, especially

in view of their not excessive fecundity. Yet it is remarkable that, despite the persecution to which this carnivore is subjected, its numbers would appear to show no appreciable diminution* in recent years (Mr. F. Hutchings and others). The amount of woodland in North Cardiganshire is not great, and it seldom bears the undergrowth necessary to shelter animals. It seems but reasonable to infer that, in order to survive and maintain its numbers on the Coastal Plateau in North Cardiganshire, there must exist some kind of natural "reservoirs" whence the Polecat spreads. It has been shown that such exist, in some degree at least, in the Borth and Tregaron Bogs. The suggestion is now advanced that the edge of the High Plateau, and at least some portions of its interior, also foster this animal, and such few facts as I have been able to gather are confirmatory of this statement. The constant process of extinction that proceeds in the valleys and preserved areas is compensated by the influx of animals from the adjacent hills.

Not only does the common Polecat hold its own in the district, but it would even appear probable that, during the last ten or twelve years, a distinct colour-variety has arisen.† In Mr. Forrest's 'Vertebrate Fauna of North Wales,' two examples of the Polecat, obtained in North Cardiganshire in the years 1902-3, are recorded. Mr. Forrest notes their light reddish-brown colour, and comments upon the absence of the usual facial markings borne by the common type. In the 'Souvenir of the

* In certain districts at the foot of the hill-barrier. In other places it is now very seldom seen.

† It may be objected that the introduction of ferret blood among the wild Polecats has tended to produce this lightness of colour. Mr. T. Hopkins told me that he lost a Ferret for a considerable time, but subsequently trapped her with her three or four young, which were all of a light-brown colour. I do not know how closely these young animals resembled the light-coloured Polecat described by Mr. Forrest and in the present paper. In this instance the colour of the male parent is not known, and it must be remembered that several of the light Polecats were taken in this neighbourhood (Crosswood). Consequently this record is an isolated and unsatisfactory one. The red-brown animals are exceedingly uniform in colour, and their young (of the first generation—nothing is known concerning the second) breed quite true to type. "Polecat-Ferrets" show considerable diversity as to colour, but after much inquiry I am unable to mention a single case where these hybrids could be mistaken for the wild light variety of Polecats.

Aberystwyth Conference, 1911,' of the National Union of Teachers, there is a note on these interesting animals by Professor H. J. Fleure. He says: "The localities from which the specimens come preclude, one would think, the hypothesis of its being due to a single sport." He concludes that, "as all the animals in a litter belonged to it" (the light variety), it proved "the light colour to be an innate character of some stability."

Since Professor Fleure wrote the above note several fresh records have to be chronicled, and they lend additional support to his statement. In July, 1915, two young Polecats* from the same litter were killed on Borth Bog. This case is a very remarkable one, because, whereas one of the young animals resembled in every respect the common dark Polecat, the other† one just as closely resembled the red-brown variety of this district (see also list of species). It may be stated here that other specimens of the light type were available for comparison at the time. It is to be regretted that neither of the parents was seen, but it is noteworthy that in the two offspring the colours show no intermingling whatever.

Since 1903 several of these light-coloured animals have been taken, and nearly all of them were examined by the writer while they were fresh. They were all killed on the Coastal Plateau between the River Dovey and Tregaron. The majority of the specimens were obtained near these two places, which are situated in the north and south of the district respectively. The interval between them, some eighteen miles, is bridged by one or two records nearer Aberystwyth, which occupies a midway position on the coast.

The total number of the red-brown Polecats which have been recorded is between twelve and fifteen. We may add 50 per cent. for other animals of this colour which have been killed and not recorded, remembering that this percentage is a high one for North Cardiganshire, where the unusual is generally inquired into. It will be gathered that the variety exists in small numbers, or else is adept at concealment. The red-brown Polecat seems to be confined to the district, and has not been recorded elsewhere.

* Now in the U.C.W. Zoological Collection.

† This proves the red-brown colour to be a Mendelian character.

In all the examples of this beautiful animal which I have seen, and unlike those noted by Mr. Forrest, the facial markings were well shown, but owing to the lighter ground colour of the animal the contrast was naturally not so great as in the common dark Polecat. In the light type individuals of both sexes occur, but, as in the case of the common Polecat, the males preponderate slightly among the caught specimens. Mr. Hutchings believes that, in one or two individuals, the irides were of a light brown colour, but in the majority of cases they are dark like those of the normal type.

However this variety may have arisen, it is extremely improbable that it arose in more than one place, whence it has spread to the several localities mentioned in the list. The relative narrowness of the Coastal Plateau in North Cardiganshire has been emphasised already, and in view of what we know of the distribution of the light Polecat, it would seem to have originated somewhere between Crosswood and Tregaron. Now Borth is some miles north of these places, and it is unlikely that the animal reached this place by way of the lowlands. It is far more reasonable to suppose that it travelled thence along the edge of the High Plateau, where it would find sufficient food for its needs. In this manner it may have contrived to establish itself in fair numbers there, and thus the captured specimens may represent mere strays to the lowlands. More records are required before the last hypothesis can be regarded as proven.

While the lightness of colour may be an instance of semi-albinism, yet in an order some of the members of which exhibit such marked seasonal colour-changes, it may conceivably have arisen in the Polecat through a change of environment or food, or other cause, and due to an upland habit.

I have compared several skulls of the Ferret, Polecat, and red-brown Polecat, and, apart from the fact that the Ferret's skull appears to be somewhat less robust than the others, I can find no marked difference.

The Pine-Marten was believed to have long ceased to dwell in North Cardiganshire, until a specimen was trapped (see list of species) near Crosswood early in 1915. This record of an animal of excessive rarity is again within the neighbourhood of Crosswood, and near the foot of the High Plateau, and it cannot be a

mere coincidence. The Marten, although well distributed, was never common in Britain, and it is very scarce at the present time. It is sometimes recorded in localities where it has not been seen for a great number of years, and because of this fact some authorities are inclined to attribute to it a wandering habit. This inference is probably correct in many cases, but, although the Pine-Marten is still found in Merionethshire, there are certain facts which tend to show that the parents of the specimen herein recorded may have dwelt in the district. A keen naturalist of this district told me that he had seen, and shot at, a Pine-Marten, just north of Aberystwyth, some years ago. The animal made good its escape, and was not seen afterwards. Another, residing in Aberystwyth, saw an animal that answered to the description of a Pine-Marten, some few years ago, in some stunted trees near Monk's Cave. I am inclined to believe that this animal has managed to survive in North Cardiganshire, on the edge of the High Plateau, or near the Teifi Lakes, but in such small numbers that it is now very seldom seen. Mr. Forrest found that the Merionethshire Martens, discovering that even the large woods in that county failed to afford them adequate protection, have now taken to the stony heights. This shows a certain degree of adaptability to changing circumstances. The presence of numerous obstacles in extreme north Cardiganshire, and the almost total absence of timber there, would seem to preclude the possibility of this young (probably in its second year when killed) animal having wandered solitarily along the uplands from Merionethshire to nearly mid-Cardiganshire. It certainly did not come *via* the Coastal Plateau. Consequently, it would seem not unlikely that this species also has been preserved from utter extinction in the district through the agency of the High Plateau.

Some of the mammalian dwellers in the uplands are said to differ slightly from their valley congeners. Mr. Hutchings states definitely that he can distinguish a mountain Fox at sight, by its greyiness and denseness of fur. I recently examined a Fox which had been killed near the summit of Plynlymon. Instead of the usual white markings on the belly and chest, in this specimen these portions were quite black. The rest of the body bore a thick admixture of black and white hairs, which imparted a

curious "grizzled" appearance to the animal. This animal's teeth showed it to be a fairly old individual. I have quoted elsewhere Mr. R. H. Dickinson's statement with regard to the grey-ness of the mountain Hares, all of which he believes to belong to the common species. These slight differences would appear to show that a moorland habit has not been without its effect upon certain mammalian types.

LITERATURE CONSULTED.

FLEURE, Prof. H. J.—"Note on the Light-coloured Local Polecat" in the 'N.U.T. Souvenir,' S. V. Galloway, Aberystwyth, 1911.

FORREST, H. E.—'The Vertebrate Fauna of North Wales,' Messrs. Witherley & Co., 326, High Holborn, London.

HARMER, Dr. S. F.—'Report on Cetacea,' British Museum of Natural History, London, 1914.

JONES, Prof. O. T.—"The Physical Features of Central Wales," S. V. Galloway, 'N.U.T. Souvenir,' Aberystwyth, 1911.

SALTER, Dr. J. H.—"The Mammals, Birds, and Butterflies of North Cardiganshire," S. V. Galloway, 'N.U.T. Souvenir,' Aberystwyth, 1911.

NOTES ON THE FAUNA OF THE COUNTRY OF THE CHESS AND GADE.

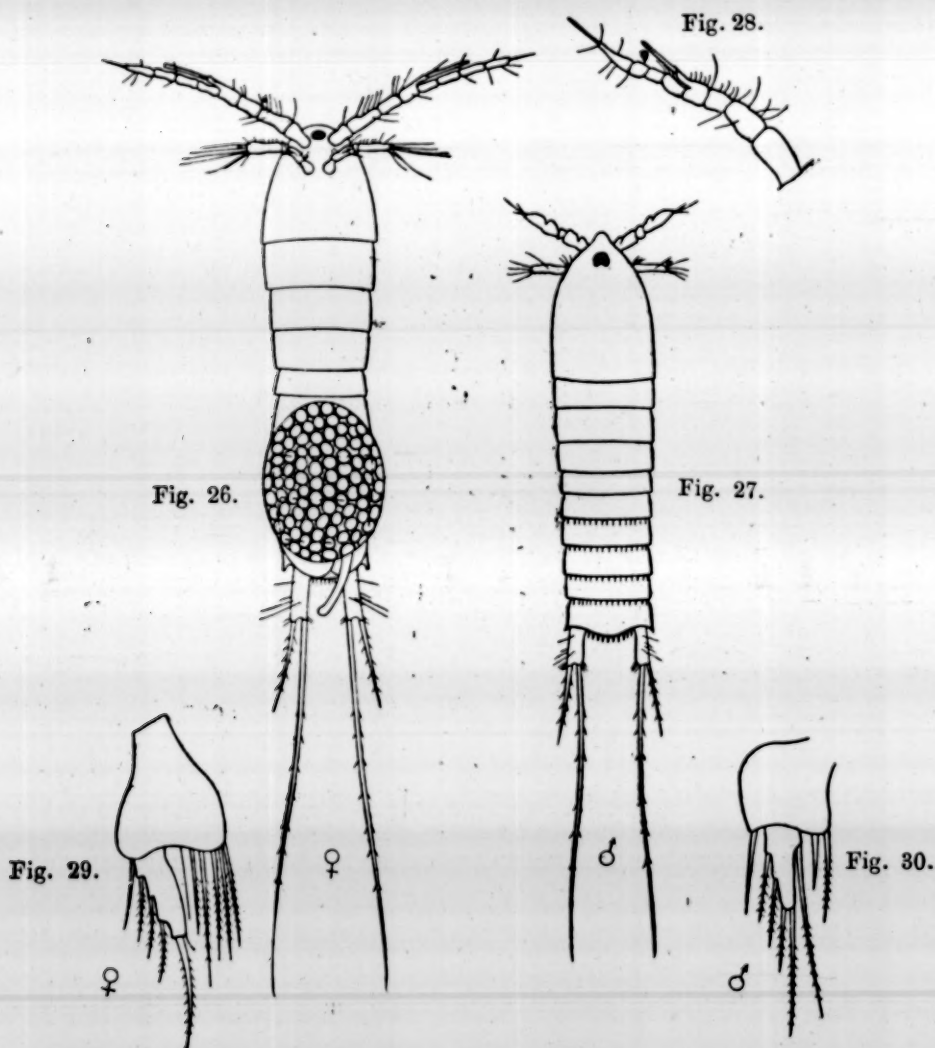
By T. E. LONES, M.A., LL.D., B.Sc.

(Continued from vol. xix, p. 425.)

THE next species to be described belongs to the family of Entomostraca called *Harpacticidæ*. In members of this family the body is cylindrical or flat, and there is no marked division between the cephalothorax and the abdomen, such as is seen, *e. g.*, in *Cyclops serrulatus*. The antennæ are short, and the swimming-feet, especially the third and fourth, are unusually long, even the fifth pair of feet being well developed. The structure of the fifth pair of feet in the male differs from that in the female, but in both sexes they are two-jointed, and the first or basal joint is usually broad and plate-like. Further, except in a few species, each female carries only one egg-sac.

2. *Canthocamptus staphylinus*, Jurine.—The chief features of this Copepod may be described in a few words. Its head is large and formed by the fusion of the cephalic and first thoracic somites. The second, third, and fourth segments are approximately equal in length. In the female the abdomen has four segments, the first being very large and formed by the fusion of the first and second abdominal somites. In the male the abdomen is composed of five segments. The posterior edges of the segments, in both sexes, are finely toothed.

The first antennæ of the female have eight joints, of which the fourth carries a long, stout seta. In the male there is a well-marked hinge-joint between the fifth and sixth segments of the antennæ, and the fourth segment carries a long, stout seta; the



cilia of the second, third, fourth, and fifth segments are numerous and crowded together. There are five stout setæ on the inner part of the basal joint of the fifth foot of the female, and two on that of the male. Other details of structure are shown in figs. 26 and 27, which respectively represent a female in ventral view and a male in dorsal view, in fig. 28, which shows one of the antennæ of the male, and in figs. 29 and 30, which show the

fifth foot in the female and the male respectively. All these figures were drawn from specimens taken from Langleybury Pool. In fig. 27 the anterior antennæ are shown as they appeared, bent and twisted upwards.

The flexibility of the long tail-setæ is very great. A specimen of *C. staphylinus* from Berkhamsted Castle Moat, obtained on September 30th, 1913, was examined when confined in a very small drop of water on the slide. During the vigorous struggles of the animal these setæ were repeatedly bent two-double without breaking. Finally they snapped, after a very great number of such bendings.

The females, especially those taken during the autumn and winter, are often found with a curved, reddish-brown spermatheca attached to the first abdominal segment. It was from this occurrence that the generic name is said to have been given by Mr. J. O. Westwood, about the year 1835, such generic name being derived from *akantha kampte* (curved spine). He refers to his genus in 'The Entomologist's Text-book,' London, 1838, p. 115, and in Partington's 'British Encyclopædia of Natural History,' London, 1836, vol. ii, p. 228; in each of these works the genus is called "*Canthocampus*, having for its type *C. staphylinus*." The name *Canthocampus* seems, however, to be a misprint for *Canthocamptus*, and all other writers, whose works on the Copepoda I have consulted, spell the generic name *Canthocamptus*.

Another interesting feature of *C. staphylinus* is the extreme flexibility of its body between the fourth and fifth segments. When specimens are watched under a lens, or even by the naked eye, especially when they happen to be moving over the sides or bottom of the vessel containing them, they are seen to bend their bodies as they swim with a peculiar jerky motion through the water. Further, when they are dead, they are commonly seen with their abdomen bent at a sharp angle to the rest of the body. From this feature Jurine gave the specific name *staphylinus* to this Copepod, because its caudal parts were bent after the manner of the caudal parts of the *staphylinus* beetle.

By some authorities on the Copepoda the species under consideration has been called *Canthocamptus minutus*, Müller. Considering, however, the relative sizes of various species of

Canthocamptus, the name *minutus* is somewhat misleading, whereas *staphylinus* indicates very well the features of flexibility referred to above. Further, Müller's description and drawings of his *C. minutus* do not prove identity with the species considered in these notes, whereas the *staphylinus* of Jurine, who gives a much better description and set of drawings, seems to be the same species. All this, however, would be of little importance if the name *C. staphylinus* were not largely used by authorities on the Copepods; but the number of authorities who adopt the name *staphylinus* is probably as great as that of those who adopt the name *minutus*.

Canthocamptus staphylinus is the commonest Harpactid in the country of the Chess and Gade, and has been taken in very large numbers during the autumn, winter, and spring. By far the best locality known to me is Langleybury Pool, and other good localities are Berkhamsted Castle Moats, Cholesbury Common Pool, Parsonage Farm Pool, and several other weedy localities, *e.g.* the brooks near the Canal, the Chess, and the Gade. The notes on Langleybury Pool show that numerous specimens, many of these being females with ovisacs or spermathecae or both, have occurred during the last few years during the months November to April, both inclusive; that the number of specimens, and especially of ova-bearing females, was less in May; that June, July, August, and September gave poor results; and that the number of specimens increased rapidly in October and reached a maximum in November.

The prevailing colour of the females was light red, but some were grey or nearly colourless; the males were usually grey. On March 26th, 1914, the specimens were very numerous, and one was very conspicuous by reason of the brilliant whiteness of the underside of its body and its swimming-feet. This seems to have been an example of albinism. Among invertebrates albinism is by no means rare; *e.g.* I have found several pure white Earwigs and almost white specimens of *Asellus aquaticus*.

The colour of the egg-sacs of *C. staphylinus* was most usually a very dark green, brown, or blue; the colours were so dark that to the naked eye the egg-sacs seemed to be black. In a comparatively small number of specimens the egg-sacs were grey, bright green, light blue, light reddish-brown, or nearly

colourless, and in one specimen, obtained from Langleybury Pool on February 3rd, 1916, the ovisac was bright red.

The manner in which the number of specimens of *C. staphylinus* varies at different parts of the year is very striking. One series of records will illustrate this. Langleybury Pool did not yield a single specimen on August 20th, 1915, although the pool was almost entirely covered by a thin film of bright green duckweed. The pool was swarming with specimens of another Entomostracan, *Daphnia rotunda*, and there were but few Copepods. On September 6th, 1915, after a very careful examination of two water samples, two specimens of *C. staphylinus* were obtained, both males. Another collection taken on September 11th, 1915, yielded only three specimens. The next collection was made on November 20th, 1915, beneath a thin coating of ice. Hundreds of specimens were obtained, very many with spermatid tubes attached, and a rather large number with ovisacs; a small proportion of the specimens, about a tenth, were males. There must have been many millions of specimens of *C. staphylinus* in Langleybury Pool on that November day, but not one specimen of *D. rotunda* was obtained. On August 20th, 1915, as already stated, no specimens of *C. staphylinus* were obtained, so that between August 20th and November 20th vast numbers of *D. rotunda* disappeared and were replaced by vast numbers of *C. staphylinus*.

Numerous specimens of *C. staphylinus* have also been obtained from Berkhamsted Castle Moats, Cholesbury Common Pool, Parsonage Farm Pool, and from a small pool near Ashley Green, but the periods of the year when the largest collections have been made have not been the same as those given above for Langleybury Pool. In the year 1913, for instance, only two specimens were obtained from Langleybury Pool on June 18th, but a large number was collected from the moats on June 3rd, and while Langleybury Pool furnished many specimens on November 12th, only a few were obtained from the moats on November 21st. Again, in May, 1914, many specimens were obtained from Langleybury Pool, and only a few from the moats.

The pools of Chipperfield Common, Leverstock Green, Chesham Road, Frithesden, and Hastoe have furnished speci-

mens, but the results obtained have been insignificant compared with those obtained from Langleybury Pool. There is not much duckweed in the pools thus yielding comparatively few specimens, and duckweed is a very suitable aquatic plant for the rapid development of *C. staphylinus*.

3. *Cyclops viridis*, Jurine.—This is a very variable species, and the numerous differences which have presented themselves caused me much confusion, especially when examining specimens about fifteen years ago from the districts of Tring, Aylesbury, Cheddington, and Dunstable. At that time Mr. Brady's 'Monograph on the Copepoda' was my chief guide. Under the name *Cyclops gigas*, Claus, he gives a description which applies to the larger forms of *C. viridis*, Jurine. Following him, I used to consider *C. gigas* to be a distinct species, and this was consistent with the finding of numerous specimens, to which his description applied, in nearly every pool from which water samples were taken. There was no difficulty in identifying them; their large size, well-packed elongated and divergent egg-sacs, the forms of their antennæ and feet, and the relative lengths of the tail-setæ proved them to be specimens of *C. gigas*. Sometimes, however, large specimens and also smaller specimens were taken, all presenting the structural features of Brady's *C. gigas*. Whether small or large, all of them seemed to be fully developed, and many of the females carried egg-sacs. The small forms seemed to have no right to the title *gigas*, for, compared with the other forms or with many other Copepods, they certainly were not giants. The doubts caused by the finding of apparently adult specimens having the same characteristic features, but differing greatly in size, were to a large extent removed when, some years later, I was able to consult Mr. Brady's "Revision of the Freshwater Cyclopidae and Calanidae" in the 'Nat. Hist. Trans. of the Northumberland, Durham, and Newcastle Society,' vol. ii (1894), and also the writings of some other authorities. Of these, some consider that both the small and the large specimens are identical and do not even constitute varieties, whereas Herrick and Richard consider *C. gigas* to be a variety of *C. viridis*, Jurine. Also, on p. 82 of the paper referred to above, Mr. Brady says: "There is no sufficient reason for the separation of the two forms. *C. gigas* appears to be simply a very

large variety of *C. viridis*." Again, M. Jules Richard considers *C. gigas* to be merely a variety presenting no specific difference from the normal type.

The numerous specimens of *Cyclops*, having the specific features of *C. viridis*, obtained during the last four years in the country of the Chess and Gade will be described in the manner stated by Brady and Richard, the smaller forms being considered to be *C. viridis*, and the large ones to be a variety *gigas*.

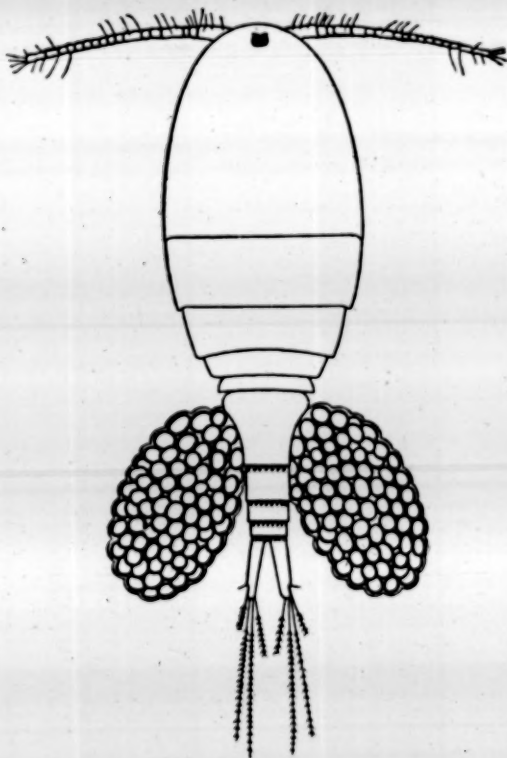
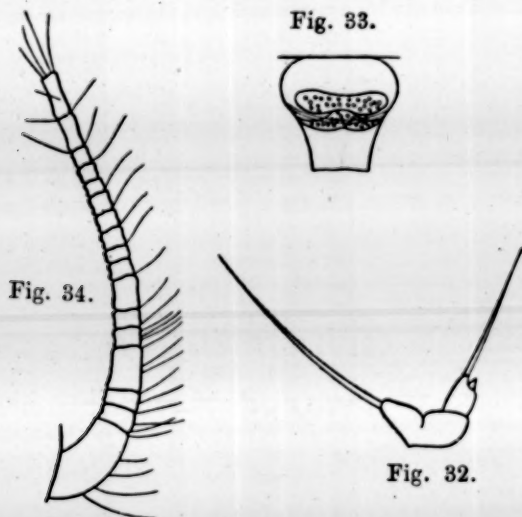


Fig. 31.

Fig. 31 represents a specimen of *C. viridis* of the normal type in dorsal view. The anterior antennæ are 17-jointed and nearly as long as the first cephalothoracic segment. In outline the cephalothorax approximates to an ellipse; in fact, an ellipse drawn with its major axis a little longer than twice its minor axis serves as an excellent guide in drawing the cephalothorax. The furcal segments are comparatively long, and each has a conspicuous lateral spine. All four tail-setæ are richly ciliated; the third is the longest, and the first or outermost the

shortest. The posterior edges of the first, second, and third abdominal segments are notched or serrated, and the posterior edge of the last segment is ciliated. The ovisacs are divergent elongated, and well packed with eggs, forty or more being visible at one view.

Fig. 32 shows the form of the fifth pair of feet, drawn from a *gigas* specimen taken from Parsonage Farm Pool. The form of the fifth is practically identical in all specimens of the species and its variety *gigas*. The first joint of the foot is very short and broad, and its outer part carries a long, curved seta ;



the second joint is small and carries a short spur, and a long, nearly straight seta.

Fig. 33 shows the form of the *receptaculum seminis*. The specimen from which it was drawn was from Langleybury Pool, and the drawing was made after the specimen had been narcotised. The *receptaculum*, especially its upper section, was somewhat contracted, but the figure shows its form very well.

Specimens of *C. viridis* have been obtained chiefly in the months of April, May, August, and November, and have been most numerous in the two months first mentioned. Chipperfield Common Pool and Langleybury Pool are very good localities for the normal form of the species. Special reference will be made

only to those collections for which my rough notes give information about variations in the specimens.

On April 8th, 1913, numerous specimens of *C. viridis* were taken from Chipperfield Common Pool. Many of them had ovisacs; they were very much the same in size, viz., about $\frac{1}{13}$ inch in total length. The antennæ varied in length, being a little shorter than the first segment in some, and as long as that segment in a few of the specimens. The lateral bristle of the furcal segments was situated decidedly farther forward than it is in the *gigas* forms, and in one specimen the innermost tail-setæ were not much longer than the outermost.

The length of the furcal segment in *C. viridis* is subject to great variation, but the greatest difference in this respect was noted among a few specimens taken from Langleybury Pool on November 20th, 1915. In some of these the length was more than three times that of the last abdominal segment.

The colours of specimens taken in the country of the Chess and Gade were dull green or brown, the ovisacs being usually dark green or brown, but occasionally light green or sandy.

Males have been found on many occasions, but they seem to be more numerous during the winter months. They were more slender and graceful than the females, with strongly hinged antennæ, and usually of a red colour. On January 27th, 1916, several water samples from Langleybury Pool yielded one male for every four females, and, on February 3rd, 1916, the water samples from the deeper parts of the same pool yielded comparatively few adult specimens of both sexes but several thousands of immature specimens, all of a red colour, in the Nauplius and Copepod stages.

Of *C. viridis*, var. *gigas*, I have very many records. In many cases they have been taken together with specimens of the normal type, but many of the rough notes record specimens of *gigas* without any reference to the normal type. Large numbers, with ovisacs, have occurred in the months of March, May, June, July, and October, while fewer specimens have been obtained in the other months of the year. The localities yielding specimens of *gigas* are also numerous, the chief being, roughly in descending order, Berkhamsted Castle Moats, Parsonage Farm Pool, Frithesden Pool, the Gade at several parts between Great Gaddesden and

Hemel Hemstead, Chipperfield Common Pool, Langleybury Pool, Chesham Road Pool, Ashley Green Pool, the Chess near Rickmansworth, Boxmoor Common Pool, and various brooks near the canal.

For identification purposes, one of the most important structural features of specimens of *Cyclops* is that of the fifth pair of feet. In most cases, the determination of their structure demands some care and patience, but in specimens of *gigas* this determination is unusually easy and can be made without the need of dissection. Fig. 32 was drawn from a narcotised specimen as it lay on its back under favourable illumination.

The largest specimen of which I have any reliable measurements was obtained from the small pool on Boxmoor Common, from which the rotifer *Hydatina senta* was obtained, as has been stated already. The specimen of *gigas* was one of a fairly large number, all females, dredged from the pool on October 16th, 1912. From the tip of its cephalo-thorax to the ends of its longest tail-setæ was 4.5 mm. or above $\frac{1}{8}$ in.

The greatest numbers of specimens obtained on one occasion were taken from the inner moat, Berkhamsted Castle, on June 3rd, 1913, and July 21st, 1913; from Frithesden Pool on October 3rd, 1913; from Parsonage Farm Pool on December 19th, 1912, March 24th, 1913, July 21st and July 27th, 1915; from Langleybury Pool on August 20th, 1915, and September 4th, 1915; from Boxmoor Pool on October 16th, 1912; and from a small pool near Ashley Green on July 21st, 1913. The rest of the collections made on many other occasions from these and other localities usually consisted of one, two, or not more than five specimens.

Ova-bearing females have been obtained in every month of the year, but they have been most plentiful in March and July. Males have been obtained in greatest numbers in February, March, July, and September; March seems to have given the best results.

The usual colour of the marginal parts of the cephalothorax (the central parts being brown or black from the presence of the alimentary canal) was green, brown, bluish, or dull grey. The ovisacs were usually green, brown, or grey of various shades, but most often dark; sandy ovisacs, also, have not been rare.

On September 12th, 1912, a white specimen with black alimentary tract was obtained from the brook near the Canal at Hunton Bridge, and on September 18th, 1912, a specimen with nearly white ova was taken from Parsonage Farm Pool. It may be mentioned that the colours of the ovisacs ought to be observed as soon as possible after specimens of Copepods have been taken and are in full vigour of life. In specimens which are dead or sickly the ova lose their distinctive colour and finally become bleached.

Besides the difference in size there is is not much to distinguish *gigas* specimens from those of the normal type. In *gigas* specimens from the country of the Chess and Gade, the basal parts of the anterior antennæ (see fig. 34) always seem to be relatively stronger and thicker than in specimens of the normal type, and the fifth pair of feet usually appear to be better developed. At any rate, their structure can be determined much more readily and easily. Variations in the relative lengths of the antennæ and furcal segments in both the normal and *gigas* forms are such as do not furnish any reliable distinguishing feature.

(To be continued.)

NOTES ON SOME IRISH BIRDS.

BY THE REV. J. M. McWILLIAM.

Co. MONAGHAN, with which most of these notes deal, is most remarkable for such birds as the Great Crested Grebe, the Water-Rail, and the Grasshopper-Warbler, which breed in considerable numbers; indeed, I know no place where these birds breed more numerously. I have no specially rare birds to record, but I have a few minor additions to make to the breeding-list as given in 'The Birds of Ireland.'

The Common Tern is mentioned in the county list as possibly breeding in Co. Monaghan. It breeds regularly, and has done so for many years, on a small chain of lakes near the border of Co. Cavan, about thirty miles from the sea. Two or three pairs come every year, but they never increase in number.

The Black-headed Gull, too, has to be added to the breeding list for this county. A few pairs bred in 1903 in the same locality as the Common Terns, and apparently numbers of these birds breed regularly somewhere in the neighbourhood, as they are constantly to be seen there in the nesting-season.

The Shoveller is given in Mr. Ussher's list as possibly breeding in Co. Monaghan. In the last ten years it has bred regularly on these same lakes. I had seen these birds occasionally in previous years, but it was not till May, 1906, that I actually found the nest. I was rowing in to a point of land,

when a drake Shoveller rose close to the shore, and was joined at once by a female. After a short search I found a duck's nest with eleven buff-coloured eggs, still quite warm; but till then I had never seen a nest of this species, and I could not be certain of the identity of the eggs or down. I waited under cover, and in a quarter of an hour the Shovellers came round again, flying low over the nest, but before the duck could go to it they were disturbed by a passing boat. In the evening I went back to the nest. The duck rose from it, but it was too dark to identify it for certain, till when it had flown a few yards the drake Shoveller joined it, and both flew round again quite close to me.

Earlier in the day I had seen another Duck's nest, but had not examined it closely, and, on thinking over the whole incident, I fancied that the eggs in it had been rather too small to belong to a Mallard. I was not able to get back to these lakes for some time, but on going there three months later I found the nest again, though the eggs had hatched out, and was able to get enough of the down and feathers to identify it also as a Shoveller's. The drake Shovellers in this place had a curious habit of sitting out in the middle of the ploughed fields, where they were as conspicuous as they could be; I saw them doing this repeatedly. Since that year the Shoveller has bred here regularly, but I have never seen more than three pairs in a season.

The Grasshopper-Warbler is not given in Mr. Ussher's list as breeding in Co. Monaghan, but it is comparatively common. I have only found the nest once, and on that occasion the place where the bird was nesting was trampled over by cattle before the eggs were laid. I watched the bird here one morning while the nest was being built. It was sitting on a low bush of some kind, a couple of feet from the ground, trilling quietly at intervals. I have seen these birds quite near me several times, running almost like Mice through the rough cover. I have heard them in many places in Co. Monaghan, but I only found the nest this once.

The Whinchat is given in Mr. Ussher's list as possibly breeding in Co. Monaghan. I shot a young bird on August 29th, 1905. Last year I tried for some time to watch a bird to her nest, but in the end the bird's patience lasted longer than mine.

I have seen Whinchats in this county on two or three occasions in the nesting season, but they are not common, and I have never found the nest.

To the list for Co. Leitrim I have to add the Rock-Pipit. It breeds commonly, as might be expected, along the three miles of the Leitrim coast-line.

For Co. Sligo I have to record the Great Black-backed Gull and the Black Guillemot. I found a nest of the Great Black-backed Gull with two eggs on the mainland of this county on May 30th, 1906. Since then I have seen these birds in the same spot in other seasons, but have never seen another nest. Does this bird not breed regularly in Co. Sligo? It may be an accidental omission, but it is not given in 'The Birds of Ireland' as breeding there.

Two or three pairs of Black Guillemots nest in one very quiet locality in the east of Co. Sligo, and have done so, I have been told, for many years. They never increase in number. Eight years ago there were three pairs, and when I went back there last year I found just the same number. I have been told that Choughs bred in this spot many years ago.

Last year I spent some time at a large colony of Arctic and Common Terns in Co. Sligo. I was surprised to find that out of perhaps five hundred Arctic Terns' nests not one had more than two eggs. There was a much smaller colony of Common Terns breeding on one part of the ground occupied by the Arctic Terns, and the nests of most of the former had three eggs. I spent some hours with a glass, identifying the birds as they settled on their nests, but could not find a single Arctic Tern with three eggs; and on the parts of the shore occupied by the Arctic Terns alone there were certainly no nests with more than two, though the clutches had been completed for some days. I had been at that colony some years before, and a note in my diary says that "very few" Arctic Terns had three eggs then. I cannot even make a guess at the proportion that year, but I fancy that several of the nests had three eggs. Last year the Little Terns, too, in this colony had fewer nests than usual with three eggs.

The breeding status of certain of the Ducks is one of the most puzzling questions in Irish ornithology. Mr. Ussher's list

gives the Wigeon as possibly having bred, though without complete proof having been obtained in a single case, in four counties, the Pochard as possibly breeding in ten counties, and the Pintail as having probably bred in two counties. He appears to admit definitely one record made many years ago for the last species in Queen's County, but definite records of the breeding of all of these Ducks in Ireland are greatly to be desired. I can only add to the mystery by saying that I have seen a drake Pochard in Leitrim early in the nesting season, in a place where it may quite possibly have been breeding, and that I have seen Pintails in two different counties quite late in the breeding season. I saw drake Pintails twice in Co. Monaghan in June some years ago, and last year, on June 24th, I saw a drake Pintail on a lake in Co. Sligo. It was at a distance of about a hundred and fifty yards from me, and the day was not too bright, but I watched it carefully with a telescope for some minutes and could distinguish the white stripe through the brown on the neck. Some day all of these Ducks will be definitely proved to breed in Ireland.

I have two inland records for the Black-tailed Godwit in Ireland. When I was staying at Ballinamore in Co. Leitrim, on April 26th, 1906, a bird of this species was brought for sale by a small boy. It was priced at one shilling, as a Woodcock! It was brought with the inevitable lie that it had been caught in a rat-trap, but I heard later that it had been shot out of a large flock at Garadice Lake. It was alive, with one wing broken, and in splendid breeding plumage. The other record for Black-tailed Godwit is for Co. Monaghan. I was at a Duck "flight" with my brother in the first week of August, 1912, when we saw what we took to be four Curlew flying past at a considerable distance and whistled them in very successfully, and some very bad shooting added one Black-tailed Godwit to the bag. A few days later we saw two more in the same neighbourhood. It would seem that on migration these birds sometimes take an inland route. In 'The Birds of Ireland' it is stated that a very few have occurred in spring, chiefly inland, and that ten occurrences altogether have been recorded in inland counties.

NOTES AND QUERIES.

MAMMALIA.

Do Rats eat the Eggs of Poultry?—Referring to the query of Mr. Steele Elliott in the 'Zoologist' (*ante*, p. 312), I have kept poultry for some years in a wood through which runs a considerable stream, and have been at times much troubled by these rodents, and have even found them asleep in the nest-boxes; yet I have never actually witnessed this propensity on the part of Rats to which Mr. Elliott refers, although it is a popular belief with poultry-keepers that they do eat eggs. This much, however, may be said with confidence, that the habit, at least in some districts, is not general.—E. P. BUTTERFIELD (Wilsden, Yorks.).

Rats and Eggs.—The question raised by Mr. J. Steele Elliott concerning the removal of eggs by Rats recalls an incident of my boyhood. Our poultry-house was adjacent to a large barn. One year some Ducks nested in the poultry-house, and we soon had good reason to suspect that Rats were eating the eggs, by finding a "sucked" one at the mouth of a hole which apparently went through the wall and under the barn floor. My father, in the hope to obtain direct evidence that Rats had actually removed eggs from the poultry-house, had some of the barn flooring opposite to the hole taken up; at about three yards from the hole we found egg-shells and two or three intact eggs near a rats' nest. I showed Mr. Elliott's note to our museum attendant, who, as he had been at one time storekeeper in a grocery, is well acquainted with the ways of Rats. He is confident that Rats suck and also remove eggs, and mentioned several instances that had come under his notice. He says that he and his friends "use china nest-eggs because the Rats would carry away a real egg if it were left in the nest for a night." He has known Rats to burrow under nests and remove the eggs.—E. W. SWANTON (Educational Museum, Haslemere).

AVES.

Yellowhammers' Nest in Rick.—No ornithological work that I have consulted (including 'Yarrell,' fourth edition; Saunders, 'Manual,'

first edition; Dresser, 'Manual,' etc.) mentions the nesting of Yellowhammers in a rick; it is therefore probably worth putting on record that this unusual site was adopted in the rickyard here in July, 1916.

Someone, economically minded, has twisted a wisp of straw into a knot and pushed it into the side of a rick of oat-straw, forming a slight bulge that may be described architecturally as a bracket; the nest is countersunk in its surface, which is about 3 ft. 7 in. from the ground, on the south-west face, and begins about 2 ft. 3 in. behind the cut front of the rick. It is lined with beards of barley from a neighbouring rick, together with some long hairs from a Cow's tail. The eaves of the thatch are little more than a foot above the nest, and, numerous straws having slipped, form a fringe helping to screen it. The four eggs therein were safely hatched by July 29th; and the young birds flourished, but on the afternoon of August 8th the nest was empty, a Rat being the most likely culprit.

The unusual site seems to have been adopted in consequence of an inspiration approaching reason, because the hedge-banks are rat-haunted, so it was doubly unlucky that the catastrophe should nevertheless have been caused by one of these pariahs.—ALFRED H COCKS (Poynetts, Skirmett, near Henley-on-Thames).

Gannet's Method of Diving.—In Prof. Newton's article on Gannet, in the 'Dictionary of Birds,' he describes it as closing its wings and dashing perpendicularly into the water. I do not know if attention has ever been called to this statement. As a matter of fact, the Gannet dives with its wings open, and obviously its eyes also, till immediately before striking the water. Neither does it always dive perpendicularly. I have often seen it diving at an angle very distinctly removed from the perpendicular, and once or twice I have seen it fly almost to the surface of the water at quite an acute angle. During its descent to the water it frequently alters its direction, sometimes using two or three strokes of its wings for that purpose, so it clearly keeps its eyes on the fish till the very end.

In the same article Prof. Newton refers to the large proportion of immature Gannets which he observed near the Stack in June, 1890. Up till now, August 8th, the proportion of immature birds off Bute has been surprisingly small; I doubt if one bird in fifty has any trace of immature plumage.

It has often been remarked how unwilling the Gannet is to fly over the land. On this shore it often flies within five or ten yards of land, but I have never yet seen one which I thought was actually over the dividing line.—J. M. McWILLIAM (Craigmore, Bute).

Nesting Notes from Sussex.—Linnet (*Linota cannabina*). May 23rd: I found a Linnet's nest built in a gorse bush about 3 ft. from the ground. It was made of dry grass lined with sheep's wool and a little hair, and contained three eggs. 24th: Another egg laid. At the time of finding this nest I was not certain of its identity, so I took one of these eggs. 27th: A fifth egg laid. Hen now sitting on four eggs. 28th and 31st: I visited the nest on both these dates and found the eggs safe. The nest is well hidden, but there is a great danger of its being robbed, as there are so many about here who are only too ready to rob and destroy nests. My fears were realised to a certain extent on visiting the nest on June 2nd, when I found the nest deserted though the eggs were in it. The latter were quite cold. Whilst walking near the site of this nest on the 23rd I crept into the gorse to look at the nest, when, to my surprise, I noticed another nest at the same height from the ground in a similar position, only a little further into the gorse patch. It contained two eggs, and they felt cold to my touch, so I took one of them. Not altogether satisfied with my conclusions, I looked at the nest the following day (the 24th) and noticed that another egg had been laid. I was unable to visit the nest again until the 27th, when it contained five. 28th: Five eggs safe. July 1st: Eggs safe and hen sitting close. 5th: The eggs were not hatched when I visited the nest this evening. 9th: Three out of the five eggs hatched. The next evening (the 10th) the fourth egg was hatched, but the fifth showed no signs of life. 12th: The four youngsters are doing well. 23rd: When I went to look at the nest this evening, there were three fully fledged young in the nest and one egg. They were strong on the wing, and flew off into the thicker parts of the gorse when I approached within a yard of them. 28th: The remaining egg cold and the nest deserted.

Blackbird (*Turdus merula*). May 26th: In a low bush, almost on the ground, by the side of a ditch, near Westdean, I found a Blackbird's nest containing four eggs. I knew of several Blackbirds' and Thrushes' nests near this one which had been pulled down as soon as the young appeared, and so I was fearful lest this one should share a like fate; but, contrary to my expectations, on going to the nest on the 27th, I found the four eggs safe. 30th: Two of the eggs were hatched when I looked at the nest this evening, the young birds opening their beaks when I parted the leaves above their nest. The third egg was just hatching. The shell was off the right side, and the youngster was making convulsive movements with its only free limb, namely, the right leg. It beat the air with this leg and then drew it back into the shell close to its body; this it did at short

intervals whilst I was watching the nest. The fourth egg was cracked, but showed no signs of movement inside. 31st: All four eggs hatched. June 2nd: Nest and young safe. The latter are covered with a blue-grey down. 7th: Young growing. The dark-brown feathers of adolescence are beginning to make themselves noticeable, especially on the back. Between this date and the 14th I was prevented by duties from visiting the nest, but on the latter date the youngsters had gone.

Goldfinch (*Carduelis elegans*). May 26th: Situated a little over 3 ft. from the ground, in a bush at the top of a high bank, I found a Goldfinch's nest. It was beautifully made of wool and hair throughout, and held five eggs. There was no bird sitting on the nest when I found it, but on the following evening (the 27th) I approached the nest as quietly as the surrounding vegetation would permit, and saw the hen bird sitting. She seemed very tame, and let me come quite close, though eyeing me all the time with a certain amount of suspicion. 28th: Eggs safe. 30th: Two of the eggs hatched; the others show no signs of hatching just at present. The two young that are hatched are covered with long, white, hair-like down. June 7th and 8th: Visited the nest on both these dates. The young birds are growing fast, though they are still covered with the long white down. The skin has a bluish appearance. 14th: 5 p.m., one bird only in the nest. 6.30 p.m., found the rest of the family in a tree about 200 yards away from the nest.

Skyllark (*Alauda arvensis*). June 27th: Whilst walking along the Eastbourne road this evening, on my way back from making an observation of the Linnet's nest above mentioned, I was startled by a Lark flying up from the grass at the side of the road. After a little searching I found the nest with four eggs, and, judging from the weight, I thought they would not be long before they hatched. I was rather doubtful whether the Lark would succeed in hatching the eggs, as the nest was so near to the road. On the 28th the eggs were safe, and by the 30th all four were hatched. July 1st: Young birds safe. 5th: Two of the birds have disappeared. I do not think they have left, as, when I looked at the nest next time (the 9th), the other two young, though quite strong, had not done so. They stumbled out of the nest into the long grass when I uncovered the nest. I should have liked to have watched the nest closely to see exactly what day the birds did leave the nest altogether, but was unable to do so until the 12th. On this date the nest was empty, so I hunted round the nest, but could find no trace of the young.

Reed Warbler (*Acrocephalus streperus*). June 7th: A nest I

found in the reeds some few days ago was completed when I visited it this evening, and contained one egg. It was very conspicuous, as it hung in the reeds where they were rather thin, so I did my best to cover it up with some of the reeds that had been broken down near it. 8th: Another egg laid. 11th: Nest empty. I did not visit it again till the 25th, when I found three eggs laid and quite warm. 26th and 28th: Eggs safe on both these dates. *July 1st*: Nest badly tilted on one side, but the eggs are still safe; it is impossible to right the nest. 9th: One well-developed young bird the sole occupant of the nest. 12th: Assuming its adult feathers. 15th: Youngster flown.—HERBERT E. J. BIGGS.

House-Martins' Nests usurped by Common Sparrow.—I used to pass a public-house near here (Wilsden) frequently last year, which had many House-Martins' nests built on its south side. First one and then another was usurped by the Common Sparrow until near the end of summer every nest of the Martin was appropriated for nesting purposes by the Sparrows, and this is by no means a solitary instance in this district. The Sparrows are driving the Martins away from the haunts of men to their more natural habitat.—E. P. BUTTERFIELD (Wilsden).

Swallow Building in Chimney.—Whilst visiting a friend recently I came across the autobiography of Thomas Cooper, author of the 'Purgatory of Suicides,' in which he speaks in an early chapter of visiting an uncle who resided at Market Rasen, and with what delight he used to watch the Swallows come to their nest, which was built in a wide chimney, whilst he sat in one of his uncle's rooms. It would be interesting to know whether this habit used to be general or merely local, for I cannot find any authority for the statement from the oldest men I have ever questioned in this district with reference to this matter (and their experience would carry them to about the first decade of the 19th century, about the period to which Cooper refers in the above work) that the Swallow ever chooses for a nesting site a chimney. It nearly always builds its nest on a rafter or beam in a barn or outhouse in this neighbourhood, and rarely builds its nest on the Continental plan, without some support for the base of nest, like the House-Martin.*—E. P. BUTTERFIELD (Wilsden).

* Both the former building of the Swallow in chimneys and the frequent usurpation of Martins' nests by Sparrows are familiar habits, but it is not surprising if they are not noticed and recorded everywhere; we saw this year Martins safely rearing young in an isolated nest at Brockley, S.E. London, in spite of the presence of Sparrows. A good deal no doubt depends upon the accessibility of other nesting sites. Sparrows, too, we have noticed in observing albinistic specimens, are very local in their attachments, and no doubt different local "strains" vary in aggressiveness. See also Mr. Cocks's note.—Ed.

House-Martins and House-Sparrows.—A dozen years ago I made some alterations to this house, and some half dozen years later various eligible sites for building purposes which it offered attracted the attention of two or three adventurous pairs of House-Martins. Their experiment proving a complete success, their numbers have increased each subsequent season, doubtless by the addition of the previous year's young birds to the old stock.

The north side of the house is the favourite, but the eastern one runs it close; the south side is less run after, while not a single nest has been built on the western side. Architectural considerations have considerable influence on this selection, but not an exclusive one. All the nests on the north side (fifteen at the moment of writing) are crowded into a somewhat short stretch of wall where the eaves overhang in a most comfortable manner, between two shallow wings or projections, on which no nest has ever been attempted. On the whole western side the eaves hardly perhaps hang over far enough to afford complete protection. On the other hand, there have been several nests on the east and south sides built on portions of wall that have no overhanging eaves to speak of, and also a few built in an upper corner of the recesses of windows. I am not aware of any recent observations on this point, but in 'Homes Without Hands' (1865, p. 317) the late Rev. J. G. Wood has some very relevant remarks, too long to quote in full, and I must only extract the following: "The points of the compass are always noted by the Martin, for there are some points which it clearly detests. . . . A wall with a north-eastern aspect is a favourite locality, while a southern wall is seldom chosen. . . . My own house, however, forms an exception, . . . for the Martins have chosen to build on the south wall only, probably because the eaves project so far that after 9 a.m. the nests are in shadow. Moreover, . . . a narrow ledge . . . forms a support for the nests."

The Martins start nesting immediately on arrival at their summer domicile; this year my first intimation of their return, at about 10 a.m. on April 23rd, was the cheerful chatter of one of these wholly delightful little birds, and I looked up in time to see it pay a visit of inspection to its old nest, which it must have flown straight to on completion of its migration. The latest young do not leave the nests until September (I found a hatched-out egg-shell freshly dropped on August 24th this year).

Perhaps once in a season a nest falls, but it would seem as if every nest were carefully inspected before being entrusted with another clutch of eggs, or rather with a second brood of young, whose weight

steadily increases and whose movements daily become more vigorous ; if the nest is not considered safe, I feel sure the old birds entirely demolish it, and scatter the *débris* in very small fragments at a distance, so that one does not find them ; and this they do even when they build the new nest on a fresh site. At any rate, nests disappear, leaving marks on the walls so that their former existence is indisputable, but no remains are visible on the ground, as is the case when a nest falls. Mr. Wood (*loc. cit.*) says that " the material of which the nests are built is a kind of mud, which becomes tolerably hard when dry, and is strong enough to exist for a series of years, and to serve for the bringing up of many successive broods." I believe, however that this lasting property depends on two factors : the consistency of the mud when used owing to the amount of the recent rainfall, and also on the geological or chemical composition of the material ; anything of a stiff clayey nature would surely last much longer than anything of a light sandy nature.

That House-Sparrows are apt to appropriate the nests of House-Martins is very well known, but it is perhaps not so well known that the builders and rightful owners may kill the young of the invaders. I think there can be no doubt this vengeance was inflicted here this season. My eye was caught one day by a fully-fledged young Sparrow lying dead on the ground under the thickest group of the Martins' nests ; and I saw that the entrance to one nest had been enlarged, the lining of poultry feathers protruding ; so going up by ladder I found that the nest contained a single young Sparrow, dead like the one on the ground ; but, while the latter was quite fresh, the one in the nest was rather stale ; and I therefrom infer that the Martins had not time to kill both the young birds before the old Sparrows returned, but had to wait to complete their full resolve until they found the coast again clear, two or three days later. Perhaps the second victim had tried to escape, and was only given the *coup de grâce* after it was actually outside the nest. I regret not having skinned the heads of these birds to look for peck-scars, but it must take a good many blows from so soft and feeble a weapon as a House-Martin's beak to kill a tough, nearly fully-grown young Sparrow. The nests are certainly inaccessible to Rats and Cats, or even, I am sure, to Squirrels ; besides which, any of these animals would have pulled the nest down. No other cause of death that seems in the least probable has occurred to me.—ALFRED H. COCKS (Poynetts, Skirmett, near Henley-on-Thames).

White Wagtail Nesting in Yorkshire.—There is little doubt that this year the White Wagtail has nested at Scarborough, thereby

verifying the remark of the author of the 'Birds of Yorkshire' (vol. i, p. 124): "There seems no reason why some of the White Wagtails which are noticed every year on migration should not remain to breed." A friend sent me some photographs of two young Wagtails just ready to fly, asking my opinion on them. The nest was in the cliffs at the north end of the town, and the finder, who saw the parent birds, was quite sure they were not Grey Wagtails; my friend was equally sure they were not Pied. He knows the birds of his district pretty well, and not long ago obtained a very good photograph of the Grey Wagtail on her nest, clearly showing the long tail of this species. I may add that he is one of the most tender-handed and tender-hearted of men, and no living creature utilised as a model for his numerous life-studies is ever in any way the worse for it.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds, Suffolk).

Zoned Type of Cuckoo's Egg.—Since recording the "zoned" Cuckoo's egg (p. 273) three more of the same type have been found in Reed-Warbler's nests, two by myself and the third by a young friend. They are all exactly alike, and whether any more were laid no one can say, as it is impossible to search all the reed-beds in the "Low Meadows." No doubt some hen Cuckoos are more prolific than others, as is the case with Owls; the Tawny Owl is sometimes content with two eggs, but a clutch of five is not unknown.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

Long-eared Owl as a Pet.—Hearing a few weeks ago that a school-boy neighbour had a pet Owl, I went to see it, quite expecting to see a young Tawny Owl, and hoping that it was not one of those which came off from our nest-box. But, to my surprise, when I was introduced to it, it looked up at me with the splendid orange-yellow eyes of a Long-eared Owl. It became very tame, and when let out would fly round and come on its owner's shoulder for food. The cry was very much like the mewling of a Cat asking to be let in. Its evening flights became more and more prolonged as the summer advanced, till at last it took one from which it never returned, much to my own regret, as well as to its possessor's. A more beautiful and interesting pet I have seldom seen, and I much wish that some bird-photographer had been here to secure a few pictures before it took its departure.—JULIAN G. TUCK.

PISCES.

A Note on the Vibratile Fin of the Rockling.—Whilst examining several fishes which had arrived from the seaside in a collecting-can

on April 1st, I noticed a good instance of the utility of the vibratile fin of the Five-bearded Rockling (*Motella mustela*) in keeping clear the dorsal groove. The fishes had been in the collecting-can for a day or two, and the water was so dense with rust that the fishes could not be seen until they were lifted out. The slimy body of the Rockling, which was about 6 in. in length, was completely covered with a thick coat of rusty particles, the vibratile fin and the groove excepted, and the latter stood out conspicuously as a smooth dark area from the red rust. Rocklings coated with sand, but with a clear groove are of course sometimes to be found; but that the fin should act so efficiently during a long and exhausting journey in a collecting-can of rusty water seems noteworthy. I may add that vibration of the fin could be started by a touch of the finger on the side of the fish, close to the fin, whilst the otherwise quiescent animal was held in the open hand for examination. The vibration was started in this way several successive times, but the movements only lasted for fifteen or twenty seconds on each occasion.—H. N. MILLIGAN.

ASTEROIDEA.

A Starfish feeding on a Spider-Crab.—A Common Starfish (*Asterias rubens*), of about 4 in. in diameter, was placed in an aquarium on November 29th last. The aquarium already contained several Edible Mussels and Purple-tipped Sea-Urchins, and also two large male individuals of the Long-legged Spider-Crab (*Stenorhynchus phalangium*). The Starfish was fed with pieces of mussel and beef. On the morning of December 4th the Starfish was found to be feeding on one of the Spider-Crabs, which was dead. It is impossible to say whether or not the Starfish had seized the Spider-Crab before death; but it may be mentioned that the crustacean seemed healthy on the previous night, and in the light of what we know of the voracity and aggressiveness of this echinoderm it may be thought not improbable that the Starfish had attacked and killed the Spider-Crab.—H. N. MILLIGAN.

